D H E C PROMOTE PROTECT PROSPER	**South Carolina Department of Health and Environmental Control** **Division of Procurement Services** **Invitation for Bid**	Solicitation No.: IFB-33871-5/29/08-EMW Date Issued: 4/30/08 Procurement Officer: E. Madison Winslow Phone No.: (803) 898-3487 E-mail Address: winsloem@dhec.sc.gov

DESCRIPTION: Contract to provide contract to provide analysis of air, soil, and water samples on an "as needed" basis for SCDHEC's Underground Storage Tank Program

The Term "Offer" Means Your "Bid" or "Proposal"

SUBMIT OFFER BY (Opening Date/Time): **May 29, 2008/2:30 pm E.T.**

NUMBER OF COPIES TO BE SUBMITTED: **One (1) original**

QUESTIONS MUST BE RECEIVED BY: **May 15, 2008/2:30 p.m. E.T.** See Specific Requirements, Number 2

SUBMIT YOUR SEALED OFFER TO EITHER OF THE FOLLOWING ADDRESSES:

MAILING ADDRESS:	PHYSICAL ADDRESS:
SC DHEC Division of Procurement Services Bureau of Business Management 2600 Bull Street Columbia, S.C. 29201	SC DHEC Division of Procurement Services Bureau of Business Management 2600 Bull Street, Room 1200 – Aycock Bldg. Columbia, S. C. 29201

Offers Must Be Sealed: See provision entitled "Submitting Your Offer"

AWARD & AMENDMENTS	Award will be posted on or after **June 1, 2008**. The award, this solicitation, and any amendments will be posted at the following web address: http://www.scdhec.net/procurement.

You must submit a signed copy of this form with your offer. By submitting a bid or proposal, you agree to be bound by the terms of the solicitation. You agree to hold your offer open for a minimum of thirty (30) calendar days after the opening date.

NAME OF OFFEROR (Full legal name of business submitting the offer)		OFFEROR'S TYPE OF ENTITY: (Check one) ☐ Sole Proprietorship ☐ Partnership ☐ Corporation (tax-exempt) ☐ Corporate entity (not tax-exempt) ☐ Government entity (federal, state, or local) ☐ Other
AUTHORIZED SIGNATURE (Person signing must be authorized to submit binding offer to enter contract on behalf of Offeror named above.)		
TITLE (Business title of person signing above)		
PRINTED NAME (Printed name of person signing above)	DATE	(See provision entitled "Signing Your Offer")

Instructions regarding offeror's name: Any award issued will be issued to, and the contract will be formed with, the entity identified as the offeror above. An offer may be submitted by only one legal entity. The entity named as the offeror must be a single and distinct legal entity. Do not use the name of a branch office or a division of a larger entity if the branch or division is not a separate legal entity, *i.e.*, a separate corporation, partnership, sole proprietorship, etc.

OFFEROR'S HOME OFFICE ADDRESS (Address for the offeror's **principal place of business**)		
CITY	STATE	ZIP CODE
PHONE	FACSIMILE	E-MAIL
STATE OF INCORPORATION (If offeror is a corporation, identify the state of Incorporation)		
TAXPAYER IDENTIFICATION NO. (See provision entitled Taxpayer Identification Number)		

PURPOSE AND SCOPE OF WORK

The Bureau of Land and Waste Management Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control (DHEC) is seeking to establish a contract to provide **analysis of air, soil, and water samples** on an "as needed" basis.

SPECIAL CONDITIONS

1. INITIAL CONTRACT PERIOD: One year from the date of award.
2. OPTION TO RENEW OR EXTEND: This contract will automatically extend on each anniversary date unless either party elects otherwise as allowed in the contract. The extensions may be less than, but will not exceed two additional one-year periods. If the contractor elects not to extend on the anniversary date, the contractor must notify the Bureau of Business Management in writing at least ninety days prior to the expiration date.
3. PRICE ADJUSTMENT BASED ON CONTRACTOR'S COST: Any request for prices increases must be submitted to the Bureau of Business Management at least ninety days prior to the automatic renewal date. Price increases will only become effective if approved in writing by the Bureau of Business Management. The maximum increase will not exceed the unadjusted percent change from the previous year shown in Table 6 of the Producer Price Index (PPI) for all commodities or in the Consumer Price Index (CPI) Urban Consumers (CPI-U), "Other Goods and Services" for services.
4. AMENDMENTS: All amendments to this solicitation shall be in writing from the DHEC Procurement Officer indicated on page one of this solicitation. DHEC will not be legally bound by any amendment or interpretation that is not in writing from the Bureau of Business Management.
5. **NOTE...THE ONLY OFFICAL CONTACT PERSON AT DHEC DURING THE SOLICITATION AND AWARD PROCESS IS E. MADISON WINSLOW, PROCUREMENT OFFICER, BUREAU OF BUSINESS MANAGEMENT, (803) 898-3487. OFFERORS ARE NOT TO CONTACT DHEC PERSONNEL LOCATED OUTSIDE THE BUREAU OF BUSINESS MANAGEMENT, PROCUREMENT SERVICES DIVISION.**
6. QUESTIONS: Questions or requests for information must be submitted in writing and received by 2:30 p.m., May 15, 2008. After this date, no further questions will be addressed. A written response will be mailed to all requestors of the bid package. The questions may be faxed to E. Madison Winslow, at (803) 898-3505. Questions may also be sent to the e-mail address listed on page 1 of the solicitation.
7. AWARD: Award will be made to lowest responsive and responsible offeror. Award may be made to one or more offerors whichever is deemed most advantageous to the State.
8. MINIMUM REQUIREMENTS: All analyses must be performed by a SCDHEC Certified Laboratory.
9. If work cannot be completed as specified, DHEC must be notified within 24 hours. Justification for not completing work must be provided to DHEC in writing within 48 hours.
10. ANALYTICAL REPORTS AND INVOICING: Deliver or mail reports to SCDHEC, Underground Storage Tank Program, 2600 Bull Street, Columbia, SC, 29201, Attention: Debra L. Thoma.

SPECIFICATIONS FOR LABORATORY ANALYSIS:

The successful contractor must:

1. Be able to perform the Analytical Methods for Volatile Organic, Extractables and Inorganics in accordance with the "Analytical Methodology for Groundwater and Soil Assessment Guidelines" dated August 24, 2005. (See Attachment A.) In case of modification of the guidelines, the contractor will be notified and will perform in accordance with any changes therein.
2. Provide all necessary sample containers and shipping materials, as needed, to insure the integrity of the samples during transport. DHEC will provide notification of planned sample collection. Materials must be delivered to the DHEC Sims/Aycock or Stern Building, or be in a location accessible to DHEC personnel, and made available within twenty-four hours of notification of need.

3. Provide all necessary sample containers and shipping materials, as needed, for the SCDHEC sampling contractor. The sampling contractor will be required to arrange for pickup or delivery of sample containers and shipping materials. Further, the analytical contractor will be required to arrange for delivery or shipment of samples to the laboratory for analysis.

4. Analyze samples within seven days of receipt or within the holding period for the analysis, whichever is less.

5. Analyze one laboratory blank for each set of samples submitted.

6. Provide the analytical reports (hard copy) within ten days of sample submittal. An electronic copy of the results should be made available to the UST Program.

7. The analytical result should be reported in the appropriate units for the sample matrix analyzed and corrected for any dilutions performed on the sample or extract. For each result reported, indicate any dilutions performed on the sample or extract. If the specified action levels for particular contaminants cannot be achieved due to matrix interferences, the laboratory must explain what steps were taken to overcome these interferences. Any questionable data is to be flagged (such as exceeding holding times, improper sample collection, QC requirement failures, instrument failure during analysis, improper preservation of sample, or any other relevant factors).

8. Samples will be run, analyzed, or reported at the lowest possible reporting limit where any compound of concern is within the upper half of a calibration curve and exceeds a published Risk-Based Screening Level (RBSL). For instance, a sample is submitted for BTEXMN by 8260. The sample is initially run at a dilution of 1:5. The reporting limit has now been elevated to 25ug/L, and Ethylbenzene is detected at 750ug/L, all other constituents are reported as ND or <25ug/L. Ethylbenzene, is reported within the upper half of the calibration curve. No further dilutions will be run, as the sample has a compound reported above a RBSL. The results should be flagged a J-Values. In a second instance, a similar sample was submitted and a second dilution was needed. The sample is initially run at a 1:10 dilution. The only reportable concentration is for Toluene at 900 ug/L. The Toluene level has not exceeded it published RBSL, even though it is in the upper half of the calibration curve, thus the sample would need to be analyzed at full strength. Toluene would be reported from the initial run, all other compounds from the full strength run. The third instance has the similar sample submitted and initially analyzed at full strength. All compounds have reportable concentrations, and the results for MTBE, Benzene, and Toluene exceed their RBSLs. The sample requires a dilution to have Xylenes within linear range of the calibration.

9. Be able to provide a 24-hour turnaround upon request. For the purpose of this solicitation, 24-hour turnaround will be defined as delivery of analytical results by facsimile transmission no later than the time of receipt of the samples by the contractor on the next business day.

10. The invoices must include a breakdown of all services rendered and be based on the items listed. The DHEC Purchase Order Number, Cost Agreement Number, UST Permit Number, and sample identification number(s) must appear on all correspondence.

BIDDING SCHEDULE

Note: Estimated quantities are for bid purposes only.

Analyte, Water	Proposed EPA Method	Detection Limit	Cost Per Analysis	Estimated Quantity	Subtotal
Purgeable Aromatics (BTEX, Naphthalene, & MTBE)	5030B/8260B			1,200	
Ethylene Dibromide (EDB)	8011			1,600	
Purgeable Aromatics (BTEX, Naphthalene, MTBE, & 1,2-DCA)	5030B/8260B			1,500	
Purgeable Aromatics (BTEX, Naphthalene, & Ethanol)	5030B/8260B			500	
Oxygenates*	8260B			500	
PAHs	8270			5	
Trimethyl benzene isomers, butyl benzene isomers, isopropyl benzene, n-propyl benzene				50	
Full list VOC Standard	8260B			5	
8 RCRA Metals				5	
Lead, Total or Suspended				400	
Lead, Filtered				100	
Dissolved Lead				200	
TPH (Waste Oil)	9070A			5	
Total Organic Carbon	9060			5	
pH				5	
Nitrate				100	
Sulfate				100	
Methane				25	
Total Dissolved Iron				5	
Ferrous Iron (Fe^{2+})				100	
Ferric Iron (Fe^{3+})				5	
				SUBTOTAL 1	

Analyte, Soil	Proposed EPA Method	Detection Limit	Cost Per Analysis	Estimated Quantity	Subtotal
Purgeable Aromatics (BTEX & Naphthalene)	5030B/8260B			25	
PAHs				25	
8 RCRA Metals				5	
Lead				5	
TCLP	1311			5	
TPH (Diesel Range)				5	
TPH (Waste Oil)	9071B			5	
TPH (Gasoline Range)				5	
Total Organic Carbon	9060			5	
				SUBTOTAL 2	

Analyte, Air	Proposed EPA Method	Detection Limit	Cost Per Analysis	Estimated Quantity	Subtotal
BTEX, EDB, & 1,2-DCA	TO14A			25	
PAHs	TO13			25	
				SUBTOTAL 3	

TOTAL FOR BIDDING SCHEDULE (SUBTOTAL 1 + SUBTOTAL 2 + SUBTOTAL 3) = _____

MULTIPLIER FOR 24-HOUR TURNAROUND =_____

* Oxygenates includes the following compounds: Ethyl tert-butyl ether (ETBE) [CAS# 637-92-3], Ethyl tert-butyl alcohol (ETBA) [CAS# 624-95-3], Tert-amyl methyl ether (TAME) [CAS# 994-05-8], Diisopropyl ether (DIPE) [CAS# 108-20-3], Tert-butyl formate (TBF) [CAS# 762-75-4], Tert-butyl alcohol (TBA) [CAS# 75-65-0], Tert-amyl alcohol (TAA) [CAS# 75-85-4], and Ethanol [CAS# 64-17-5].

OTHER CRITERIA:

1. Provide your SCDHEC laboratory certification number and the name and SCDHEC certification number of any sub-contracted laboratories.

_____

_____

_____

_____

2. When can you start accepting work?

_____

3. Have there been any complaints registered with any regulatory agencies about your company's performance in any state where you have performed services?

Yes _____ No _____

If yes, indicate which state(s), the reason(s), and the date(s) of the complaint(s). Continue on an additional sheet if necessary.

_____

_____

_____

_____

_____

PLEASE READ THE FOLLOWING CAREFULLY PRIOR TO COMPLETING BID

INSTRUCTIONS TO BIDDERS

DISCUSSIONS AND NEGOTIATIONS: By submission of a bid, bidder agrees that during the period following issuance of this solicitation and prior to notification of intent or award of a contract, the bidder shall not discuss this procurement with any party except members of the DHEC Procurement Division or other parties designated in this solicitation. Bidder shall not discuss or attempt to negotiate with the using area or program any aspects of the procurement without prior approval of the DHEC Procurement Division Buyer responsible for the procurement. Infractions may result in rejection of the violator's bid.

1. Unless otherwise required herein, only one signed copy of the invitation to bid is required.
2. Bids "faxed" directly to the DHEC Procurement Office will not be accepted or considered for award.
3. Bids, amendments thereto or withdrawal request must be received by the time advertised for bid opening. It is the bidder's sole responsibility to insure that these documents are received by the person (or office) at the time indicated in this solicitation document. DHEC Underground Storage Tank Environmental Remediation Procedures shall govern any withdrawal request received after the time of the bid opening.
4. When specifications or descriptive papers are submitted with the bid submission, enter bidder's name thereon.
5. Submit your signed bid on this form. Show the bid number on the envelope as instructed. DHEC assumes no responsibility for unmarked or improperly marked envelopes. All envelopes received showing a bid number are placed directly under locked security until the date and time of opening. Do not include more than one bid invitation per envelope. If directing any other correspondence, address the envelope to the Procurement Officer but do not include the bid number on the envelope since it does not include your bid.
6. Bidders must clearly mark as "CONFIDENTIAL" each part of their bid which they consider to be proprietary information that could be **exempt from disclosure** under Section 30-4-40, Code of Laws of South Carolina 1976 (1986 Cum. Supp.; Freedom of Information Act). If any part is designated as confidential, there must be attached to that part an explanation of how this information fits within one or more categories listed in Section 30-4-40. DHEC reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the State, DHEC or its agents for its determination in this regard.
7. By submission of a bid, **you are guaranteeing** that all goods and services meet the requirements of this solicitation during the contract period.
8. **Tie bids** will be resolved as outlined in DHEC Underground Storage Tank Environmental Remediation Procedures.
9. **Do not include any taxes** that DHEC may be required to pay in the bid price. Upon submission of a bid by a state agency, the Procurement Officer will compute a 5% sales and use tax to the non-state agency bids when applicable (service and labor excluded) in determining the low bidder. This procedure conforms to the SC Tax Commission Sales and Use Tax Regulation 117-174-. 95.
10. **Correction of errors on this bid form:** All prices and notations should be printed in ink or typewritten. Errors should be crossed out, corrections entered and initialed by the person signing the bid. Erasures or use of typewriter correction fluid may be cause for rejection. No bid shall be altered or amended after the time specified for the bid opening.
11. **Ambiguous bids** that are uncertain as to terms, delivery, quantity, or compliance with this solicitation may be rejected or otherwise disregarded.
12. Any bidder desiring to exercise a grievance may do so under section IV of DHEC Underground Storage Tank Environmental Remediation Procedures. All correspondence should be directed to the Director of Procurement Services, Bureau of Business Management, 2600 Bull Street, Columbia, SC 29201.
13. **Failure to respond** to three consecutive bid notices may result in removal of bidder's name from the mailing list.

GENERAL PROVISIONS

14. DHEC reserves the right to reject any and all bids, and to cancel this solicitation.
15. **Unit prices** will govern over extended prices unless otherwise stated in this solicitation.
16. **Prohibition of Gratuities:** Amended section 8-13-420 of the 1976 Code of Laws of South Carolina States: "Whoever gives or offers to any public official or public employee any compensation, including a promise of future employment, to influence his action, vote, opinion or judgment as a public official or public employee or such public official solicits or accepts such compensation to influence his action, vote, opinion or judgment shall be subject to the punishment as provided by Section 16-9-210 and Section 16-9-220. The provisions of this section shall not apply to political contributions

unless such contributions are conditioned upon the performance of specific actions of the person accepting such contribution nor shall they prohibit a parent, grand-parent or relative from making a gift to a child, grandchild, or other close relative for love and affection except as hereafter provided".

17. **Bidder's Qualification:** Bidders must, upon request of DHEC, furnish satisfactory evidence of their ability to furnish products or services in accordance with the terms and conditions of these specifications. DHEC reserves the right to make the final determination as to the bidder's ability to provide the products or services requested herein.
18. **Bidder's Responsibility:** Each bidder shall fully acquaint himself with conditions relating to the scope and restrictions attending the execution of the work under the conditions of this solicitation. It is expected that this will sometimes require on-site observation. The failure or omission of a bidder to acquaint himself with existing conditions shall in no way relieve him of any obligation with respect to this bid or to the subsequent contract.
19. **Amendments:** All amendments to and interpretations of this solicitation shall be in writing from the DHEC Procurement Office. Neither DHEC nor the Procurement Officer shall be legally bound by any amendment or interpretation that is not in writing.
20. **Award Criteria:** Award shall be as indicated herein to the lowest responsible and responsive bidder whose bid meets the requirements and criteria set forth in this solicitation. Award may take longer than fourteen days. A copy of the award notice should be posted on Procurement Services' website at: dhec.sc.gov/procurement.
21. **Rejection:** DHEC reserves the right to reject any bid that contains prices for individual items or services that are unreasonable when compared to the same or other bids if the rejection is in the best interest of the State.
22. **Competition:** This solicitation is intended to promote competition. If the language, specifications, terms and conditions, or any combination thereof restricts or limits the requirements in this solicitation to a single source, it shall be the responsibility of the interested bidders to notify the DHEC Procurement Office in writing so as to be received five days prior to the opening date. Notification may be "faxed" to the DHEC Procurement Office, (803) 898-3505. The solicitation may or may not be changed but a review of such notification will be made prior to award.
23. **Order of Precedence:** In the event of inconsistency between provisions of this solicitation, the inconsistency shall be resolved by giving precedence in the following order; (A) the bidding schedule, (B) the specifications, (C) general conditions, (D) special provisions or special conditions of the contract whether incorporated by reference or otherwise, and (E) instruction to bidders.

GENERAL CONDITIONS

24. **Contract Administration:** Questions or problems arising after award of this solicitation/contract shall be directed to the DHEC Procurement Office, 2600 Bull Street, Columbia, SC, 29201. Reference the solicitation and contract number.
25. **Default:** In case of default by the contractor, DHEC reserves the right to purchase any or all items in default in the open market, charging the contractor with any additional costs. The defaulting contractor shall not be considered a responsible bidder until the assessed charge has been satisfied.
26. **Save Harmless:** (This General Condition does not apply to solicitations for service requirements). The successful bidder shall indemnify and save harmless the State of South Carolina and DHEC and all its officers, agents and employees from all suits or claims of any character brought by reason of infringing on any patent, trade mark or copyright. The bidder shall have no liability to DHEC if such patent, trademark or copyright infringement or claim is based upon the bidder's use of material furnished to the bidder by the State.
27. **Publicity Releases:** By submission of a bid, the contractor agrees not to refer to award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by DHEC or user.
28. **Tax Credit Availability:** Bidders interested in income tax credit availability by subcontracting with Certified Minority Firms should contact the Office of Minority Business Assistance, 1205 Pendleton Street, Columbia, SC, 29201. (803-734-0562)
29. **Affirmative Action:** The successful bidder will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of race, color, religion, sex, national origin or physical handicap.
30. **Assignment:** Unless otherwise indicated in this solicitation, no contract or its provisions may be assigned, sublet, subcontracted, or transferred without the prior written consent of the DHEC Procurement Office.
31. **Termination:** Any contract resulting from this solicitation may be terminated by DHEC by providing a thirty-day advance notice in writing to the successful contractor.

32. **Non-Appropriations:** Any contract entered into by DHEC resulting from this solicitation shall be subject to cancellation without damages or further obligation when funds are not appropriated or otherwise made available to support continuation of performance in a subsequent fiscal period or appropriated year.
33. **Convenience:** In the event that this contract is terminated or canceled upon request and for the convenience of DHEC without the required thirty days advance written notification, then DHEC shall negotiate reasonable applicable termination costs.
34. **Cause:** Any contract resulting from this solicitation may be terminated without advance notice by DHEC for cause, default or negligence on the part of the successful contractor.
35. **S.C. Law Clause:** Upon award of a contract under this bid, the person/partnership, association or corporation to whom the award is made must comply with the laws of South Carolina which require such person or entity to be authorized and/or licensed to do business with this State. Notwithstanding the fact that applicable statutes may exempt or exclude the successful bidder from requirements that it be authorized and/or licensed to do business in this State. By submission of a bid, the bidder agrees to subject himself to the jurisdiction and process of the courts of the State of South Carolina as to all matters and disputes arising or to arise under the contract and the performance thereof, including any questions as to the liability for taxes, licenses or fees levied by the State of South Carolina.
36. **Quality of Product:** (This general condition does not apply to solicitations for printing or service requirements.) Unless otherwise indicated in this solicitation, it is understood and agreed that any item offered or shipped as a result of this solicitation shall be new and in first class condition, that all containers shall be new and suitable for storage or shipment, and that prices include standard commercial packaging. If items that are other than new (i.e., remanufactured or refurbished) are desired to be bid, the bidder must obtain written permission to bid such items at least five days in advance of the bid opening date. Written permission must be obtained from the DHEC Procurement Office.
37. **Compliance with Federal Requirements:** S.C. State or Federal requirements that are more restrictive shall be followed in bidding, awarding and performance of this contract.
38. **Drug-Free Workplace:** Required by Section 44-107-10 (Drug Free Work-Place Act) of the SC Code of Laws, 1976, as amended. By submission of a bid, the bidder certifies that he will comply with all aspects of the Drug-Free Workplace Act and will not engage in the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance in the performance of this contract. This certification also applies to any individual or firm employed by the contractor.
39. **Confidentiality Policy:** The successful contractor agrees to abide by DHEC's policy of confidentiality which states in part that all information as to personal facts and circumstances given or made available to employees and/or contractors of DHEC in administration of programs shall be held confidential and shall not be divulged without the express written consent of the individual(s) to which it pertains.
40. **Item Substitution:** No substitution of items will be allowed on any purchase made from the awarded contract without written permission from the DHEC Procurement Office.
41. **Outside Contractor Program:** If applicable to scope of contract, contracted employees working on DHEC properties are entitled to information about hazardous chemicals present at DHEC; and DHEC's personnel are entitled to information about hazardous chemicals brought to the facilities by contractors. In order to assure continued compliance with the Hazard Communication Standards while contractors are on DHEC property and to control potential compliance obligations under the Superfund Amendments and Re-authorization Act, it is DHEC's policy to:

    A. Obtain written assurance that the contractor's employees have been trained to understand the hazards of the chemicals at DHEC and how to use appropriate personal protective equipment. All personal protective equipment and training required for the contractor's employees will be provided by the contractor at the contractor's expense. (This includes SC State General Services employees).

    B. Require the contractor to notify the DHEC Bureau of Business Management or the appropriate DHEC unit Director when introducing hazardous chemicals into DHEC work areas, which may harmfully expose DHEC employees. If the contractor is introducing such hazardous chemicals into any DHEC facility or onto DHEC property, the contractor shall provide the DHEC Division of Procurement Services or the DHEC unit Director copies of the Material Safety Data Sheets (MSDS) for those chemicals. The DHEC Division of Procurement Services or the DHEC unit Director should provide appropriate information to the DHEC employees before the contractor(s) enter any DHEC facility with chemicals.

    C. DHEC reserves the right to refuse to allow any contractor to bring any chemical onto DHEC property. The Department also reserves the right to refuse to allow any contractor to bring certain quantities of chemicals on DHEC property.

ATTACHMENT A

South Carolina Department of Health
and Environmental Control

ANALYTICAL METHODOLOGY FOR GROUNDWATER AND SOIL ASSESSMENT GUIDELINES

Underground Storage Tank Program
Bureau of Land and Waste Management
2600 Bull Street
Columbia, South Carolina 29201
Phone (803) 896-6240 Fax (803)896-6245

August 24, 2005

ANALYTICAL METHODOLOGY FOR GROUNDWATER AND SOIL ASSESSMENT GUIDELINES

The analytical methodologies discussed in this document pertain to groundwater and soil analyses for petroleum related sites regulated under RCRA Subtitle I, the SUPERB Site Rehabilitation and Fund Access Regulations (R.61-98), and the Pollution Control Act. All required analyses are to be performed by a laboratory certified by the South Carolina Department of Health and Environmental Control (SCDHEC) per State Regulation 61-81 for the appropriate EPA methodology. Deviations from the analytical methodology presented must be approved prior to use for compliance purposes. Questions concerning appropriate analytical methodology should be directed to the Underground Storage Tank Program. The laboratory report for the analyses must include the S.C. Laboratory Identification Number for the laboratory performing the analyses. If analyses are subcontracted to another laboratory for analysis, the laboratory's S.C. Laboratory Identification Number must be documented beside the analyses performed by that laboratory.

Sampling Methodology

Sample containers, preservation techniques, and holding times for the required analyses for water and soil are addressed in Tables 1 and 2. Additional information is provided below concerning the collection and the analysis of volatile organic compounds (VOCs).

It is very important that you contact the analytical laboratory for the proper sample containers, chain-of-custody forms, and sample collection instructions prior to sampling for volatile organics. The low-level volatile analysis will require increased coordination between the field personnel and laboratory personnel. When collecting the samples, the appropriate tools and sample collection devices must be available. For more information on sample collection procedures, refer to EPA Publication SW-846, Third Edition, Updates I, II, IIA, and III, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods". The document is available on-line at http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm.

Volatile Organic Compounds (VOCs)

Method 5030B incorporates the analysis of aqueous samples, soils, and other solid samples with a high VOC concentration (greater than 200 µg/kg) or a high concentration oily waste sample (greater than 200 µg/kg) using the conventional purge and trap apparatus. This procedure is used in conjunction with EPA Method 8015B and 8260B.

Method 5035 describes the collection and analysis of low-level VOC solid samples (soils, sediment, and solid waste with VOC concentrations in the range of 0.5 to 200 µg/kg). The analysis consists of a closed system purge-and-trap method. Method 5035 utilizes a hermetically sealed sample vial, the seal of which is never broken from the time of sampling to the time of analysis. Since the sample is never exposed to the atmosphere after sampling, the losses of VOCs during sample transport, handling, and analysis are negligible. The method also describes the procedures for collecting and preparing solid samples and oily wastes containing high concentrations of VOCs. This procedure is used in conjunction with EPA Method 8015B and 8260B.

Method 5030B Ground-Water Sample Collection

Standard 40 mL glass screw-cap VOA vials with Teflon-lined silicone septa are to be used for collecting water samples for volatile analyses. Samples must always be collected in duplicate after correctly purging the ground water monitoring wells. The sample container needs to contain the necessary preservative and the water should be introduced into the vials slowly without introducing any air bubbles within the vial. The vials should be completely filled at the time of sampling, so that when the septum cap is fitted and sealed, and the vial inverted, no headspace is visible. The vial must not be opened prior to analysis to preserve its integrity. Immediately after collection, the sample vials must be labeled and stored at 4°C.

Method 5035 Solid Sample Collection

There are various options that can be used when collecting soil samples for low-level VOCs. As with any sampling procedure for volatiles, care must be taken to minimize the disturbance of the sample in order to

minimize the loss of volatile components. Always wear gloves whenever handling the tared sample vials. Several techniques may be used to perform the transfer of the sample to the relatively narrow opening of the low concentration soil vial such as the Encore™ sampler, a cut off disposable plastic syringe, or a stainless steel spatula.

(1) Encore™ Sample Collection:

The Encore™ sampler is both a sampler and a container for low-level soils. It is designed to collect an average weight with the exact weight to be determined in the lab. It is disposable and is also designed to have zero headspace. If the Encore™ sampler is used, the field personnel must get the sample to the laboratory within 48 hours of collection to preserve the sample.

A separate sample may need to be collected to enable the laboratory to perform a pretest on the soil to determine if the soil sample contains carbonate minerals that will effervesce upon contact with the acidic preservative solution in the low concentration sample vial. If the sample cannot be preserved with sodium bisulfate, the sample is then transferred to a pre-weighed vial with 5 mL of reagent water added to it. The unpreserved sample in the vial must either be analyzed immediately or frozen within the 48-hour time frame. It still must be analyzed within the 14-day holding time. Extra samples must still be collected for high concentration analysis, screening, and moisture content.

(2) Coring Device/Drive Tube with Field Preservation:

If using a coring device or drive tube device, collect several trial samples with the device and weigh each trial sample, noting the length of the soil column in the device. Use the data to determine the length of soil in the device that corresponds to 5.0 g. This can be done prior to going into the field to collect the samples, or if a portable balance is available this can be performed in the field. The sample is collected using the device and placed into a pre-weighed vial, provided by the laboratory, with the sample preservative and a stir bar. It is very important that the transfer of the sample be made as quickly as possible with very little disturbance to the soil to avoid loss of volatiles. The weight of the sample can be determined in the field and also determined in the laboratory.

A portable balance (capable of weighing to 0.01g) can be used to weigh the sealed vial containing the sample to ensure that approximately 5.0 g of sample has been added to the vial, but this is optional. This weight determination, if made in the field, must be documented on the sample container and in the field records. If a portable balance is used, the balance calibration must be verified in the field using an appropriate weight for the sample containers employed. The appropriate reference weight must be used at least once daily prior to weighing any samples and records must be kept for the balance checks.

For Any Sample Collection Method:

All low-level soil samples must be collected at least in duplicate to allow the laboratory an additional sample for reanalysis. The additional soil sample(s) must be collected from the same soil stratum or the same section of solid waste being sampled and within close proximity to the location from which the original sample was collected.

Additional samples must be collected for screening, dry weight determination, and high concentration analysis (if necessary) without the preservative. If high concentration samples are collected in vials containing methanol, an additional sample should be collected for screening and dry weight determination in a vial without preservative.

The laboratory performing the analysis needs to be contacted prior to sample collection to ensure that all necessary containers (with or without preservative) are available and that the proper sampling technique is used.

Options for sample collection appear below:

Option 1 - Encore

1) Core with the Encore™ device in the field.
2) Collect two Encore™ samples/sample location.
3) Collect one glass container (2 oz.) with septum lid for the high level and to determine moisture content.

4) Collect one headspace vial for screening.
5) Laboratory preservation/preparation within 48 hours of collection for the Encore™ samples and high level samples.

Option 2 - Coring Device/Drive Tube with Field Preservation:
1) Core and weigh samples in field. (Balance required).
2) Collect two low-level vials (preserved). Vials must be obtained from the laboratory performing the analysis.
3) Collect one glass container (2 oz.) with septum lid for high level and moisture determination. High-level sample must be transferred to methanol within 48 hours of collection or the high level sample can be collected in methanol.
4) Collect one headspace vial for screening.

Option 3 - Field Screening
1) Field Screening.
2) Core and weigh in field.
3) Collect 2 low-level vials (preserved) Or One high-level vial.

Method 5035 Sample Preservation

Method 5035 addresses the preservation of the low concentration soil samples with sodium bisulfate to ensure a sample pH of 2. If using option 1, two pre-weighed sample vials with the sodium bisulfate preservative solution must be obtained from the laboratory along with two pre-weighed sample vials with 5 mL of reagent grade water (used if vigorous effervescence). The laboratory will also provide a sample vial to check the reaction of the soil with the sodium bisulfate preservative solution. Soil samples that contain carbonate minerals (limestone) may effervesce upon contact with the acidic preservative solution in the low-level concentration sample vial. If the amount of gas generated is very small, any loss of volatiles as a result of such effervescence may be minimal, if the vial is sealed quickly. If at all possible the sample should be preserved. A test sample should be collected, added to a vial with the preservative and checked for effervescence. If a rapid or vigorous reaction occurs, discard the sample and collect low concentration samples in vials that contain 5 mL of reagent water. Soil samples in reagent water with no preservative must be analyzed within 48 hours of collection or frozen within 48 hours of collection. Records must be maintained on the chain-of-custody documenting the necessary actions taken by the laboratory.

Soil samples for volatile analysis that are preserved with the sodium bisulfate preservative solution are to be cooled to approximately 4°C, packed in appropriate containers, and delivered to the laboratory on ice.
These are to be analyzed within 14 days of sample collection. Samples receiving no preservation in the field other than cooling to 4°C must be delivered to the laboratory the same day as collected. Once in the laboratory, the samples must be analyzed or frozen within 48 hours of sample collection. The laboratory sample storage area must be free of organic solvent vapors. All samples need to be analyzed as soon as possible, not to exceed the designated sample holding time of 14 days from sample collection for preserved samples or 48 hours for unpreserved samples.

Field Notes for Sample Collection

Field notes must be maintained by the sample collector to document the collection of the samples. These field notes must be attached to the chain-of-custody form submitted to the laboratory and the laboratory must attach the copy of the completed chain-of-custody with the attached field notes. If the field notes do not accurately reflect how the sample was collected, the results for the testing may not be accepted by the Department.

Analytical Methodology

Tables 3 and 4 address the analytical methodology approved for the analysis of groundwater and soil samples pertaining to gasoline, diesel, fuel oil, and kerosene. Tables 5 and 6 address the analytical methodology approved for the analysis of groundwater and soil samples pertaining to waste oil. Other sample extraction procedures can be used provided the laboratory has the necessary certification.

Sample screening needs to be performed by the laboratory to determine the appropriate sample preparation procedure for the particular sample, such as the low-concentration closed-system direct purge-and-trap method, the high concentration method, or the nonaqueous liquid (oily waste) methanol or PEG dilution procedure. Calibration standards used for instrument calibration must also contain approximately the same amount of sodium bisulfate preservative as the sample, as the presence of preservative may affect the purging efficiencies of the analytes. If sodium bisulfate preservative is not used for the samples, then the standards used for instrument calibration must also not contain sodium bisulfate. Therefore laboratories will possibly have two different calibration curves for soil analysis. Analysis records must document the referenced calibration curve used for the quantification of sample results.

Chain-of-Custody and Sample Analysis Documentation

Soil and groundwater samples collected for petroleum-related sites must be handled in a manner that is consistent with the analytical testing method and that preserves the integrity of the sample. All environmental sample results submitted to the Department for work performed at these sites must include adequate documentation of proper sample collection and analysis. The details of soil collection must be documented on the laboratory chain-of-custody form, field notes, laboratory results, and/or the environmental report. Sufficient details should be included to address collection and preservation methods employed in the field and in the laboratory. The Responsible Party (RP), usually the tank owner or operator or other entity responsible for the release, must ensure that the environmental contractor gathers this information. The RP is also responsible for ensuring that the laboratory is certified for the analyses in question and that this information is submitted to the Department with the sample results.

The following information must be included in the documentation submitted to the Department:

1) South Carolina Laboratory Identification Number: This number is assigned to a laboratory once it is granted certification by the South Carolina Department of Health and Environmental Control. **Certification is granted on an analyte-by-analyte basis; therefore, it is imperative that the laboratory's certification status for a particular analyte or method be verified through the Department (Call (803) 896-0970).** Analyses performed by a laboratory without certification for the analyte or method will not be accepted by the Department.

2) Sample type, description, location, and UST Permit #: Describe the sample (soil, groundwater, surface water, etc.) and the location where the sample was collected. The field/laboratory identification must clearly correlate the sample with sample locations shown on a map.

3) Type of sample preservation: Indicate type of sample preservation performed on the sample. The laboratory must verify preservation of the water and soil samples for volatile analyses.

4) Sample integrity upon receipt in the lab: Describe if the sample container was broken or cracked, if the sample cap was loose or poorly sealed (e.g. due to sediment on the cap threads), or if the sample integrity was otherwise questionable. For Method 5035, the laboratory is responsible for ensuring that these samples have been collected properly. Any discrepancies must be addressed on the chain-of custody form and on the sample results. Preservation steps taken by the laboratory must be sufficiently documented on the chain-of-custody form or laboratory record.

5) The temperature of the sample when received: If the sample was received in ice and solid ice is still present, report the sample as "received on ice." Exact sample temperature need not be reported for samples received on ice. If the sample is cooled using "blue ice" packs or the ice used in shipping is melted, then the temperature of a "temperature blank" must be reported. If the ice used to ship the sample has melted, the temperature of the melt water may be substituted for a temperature blank.

6) The analytical methods used to analyze the samples: When using an EPA method, specify the number and when analyzing for a specific petroleum product, list the petroleum product with the method for sample preparation or extraction and then list the determinative method. For example, BTEX in soil - EPA Method 5035/8260B.

Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).

7) Sample results: The analytical result should be reported in the appropriate units for the sample matrix analyzed and corrected for any dilutions performed on the sample or extract. Report soil results as µg/kg or mg/kg on a dry-weight basis with percent moisture and groundwater results as µg/L or mg/L. For each result reported, indicate any dilutions performed on the sample or extract. **If the specified action levels for particular contaminants cannot be achieved due to matrix interferences, the laboratory must explain what steps were taken to overcome these interferences. The laboratory can use antifoam reagents and appropriate cleanup procedures to eliminate these matrix interferences.**

8) Laboratory reporting limit: The laboratory's reporting limit for the specific method or analyte must be indicated with the analytical result. The reporting limit is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard. This is the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point.

9) Reporting Limit: The reporting limit is based on the lowest non-zero standard in the calibration curve.

10) Surrogate recovery data: Surrogate recovery data for each sample must be reported for each organic determinative method employed.

11) Date and time sampled, received, extracted and analyzed: The laboratory's certificate of analysis must include the date and time the sample was collected, date and time the sample was extracted by the lab (if applicable), date and time the sample analysis was completed, and the analyst. The date and time the sample was received in the lab must be included on the chain-of-custody. For EPA Method 5035, if using the Encore™ sampling device, the laboratory must also document the date of transfer from the sampling device to the analysis vial and storage conditions. If the date of analysis is past the acceptable holding time, the lab needs to ask for a resample to avoid rejection of results by the Department.

12) Product type identification: If product type identification is made for a petroleum hydrocarbon, it needs to be identified and quantified. Other helpful information such as the type of site or the results of field screenings are to be reported.

13) Flagged data: Any questionable data is to be flagged (such as exceeding holding times, improper sample collection, QC requirement failures, instrument failure during analysis, improper preservation of sample, or any other relevant factors).

14) Sample odor: Any obvious sample odor must be reported.

15) Unidentified but detected contaminants: Any detected but unidentified contaminants or peaks must be reported.

A complete chain-of-custody form must be maintained and submitted with the results for all samples reported to SCDHEC. The chain-of-custody forms must document all transfers and receipts of the samples. Field notes must be attached to the chain-of-custody to accurately document how the samples are collected. Certificates of analysis from each laboratory performing the analyses must be also be submitted.

If you have questions concerning the methodology requirements and/or questions concerning a laboratory's certification status, please contact the Office of Environmental Laboratory Certification of SCDHEC at (803) 896-0970.

If you have questions or would like a copy of the South Carolina UST Control Regulations or other UST related documents, please contact the Underground Storage Tank Program at (803) 896-6240. Copies can also be obtained at http://www.scdhec.gov/eqc/admin/html/eqforms.html#UST.

Table 1
Required Containers, Preservation Techniques, Holding Times
Ground-Water Samples[1]

Contaminant	Container[2]	Preservation[3]	Holding Time[4]
Volatiles[7] (BTEX, MTBE, Naphthalene, & 1,2-DCA)	2 x 40-mL glass vials with Teflon-lined septum caps	Cool to 4°C and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
1,2-dibromoethane (EDB)	2 x 40-mL glass vials with Teflon-lined septum caps	Cool to 4°C and adjust pH to less than 2 with HCL, Residual chlorine present: add $Na_2S_2O_3$ to make 0.008% concentration	14 days
Polynuclear Aromatic Hydrocarbons (PAH)	Amber glass container with Teflon-lined lid	Cool to 4°C	7 days until extraction 40 days after extraction
Oxygenates[8]	2 x 40-mL glass vials with Teflon-lined septum caps	Cool to 4°C and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
Total Petroleum Hydrocarbons (TPH) Waste Oil	1-Liter Glass	Cool to 4°C H_2SO_4 or HCl to pH 2	28 days
Total Petroleum Hydrocarbons (TPH) (High Boiling Point Fuels)	1-Liter Amber Glass container with Teflon-lined lid	Cool to 4°C	7 days until extraction 40 days after extraction
Methane	2 x 40-mL glass vials with Teflon-lined septum caps	Cool to 4°C	14 days
Dissolved Oxygen	G (bottle and top)	None required	Analyze immediately[5]
Ferrous Iron	G	None required	Analyze immediately[5]
Nitrate	P, G	Cool to 4°C	48 hours
Sulfate	P, G	Cool to 4°C	28 days
Total Organic Carbon	P, G	Cool to 4°C H_2SO_4 or HCl to pH 2	28 days
Mercury	P, G	HNO_3 to pH <2	28 days
Metals (except mercury)[6]	P, G	HNO_3 to pH <2	6 months

1 SW846, Third Edition, Updates I, II, IIA, III and IIIA, Table 4-1 Sample Containers, Preservation, Techniques, and Holding Times. 40 CFR Part 136, Table II, Required Containers, Preservation Techniques, and Holding Times.
2 Polyethylene (P) or Glass (G).
3 Sample preservation must be performed during or immediately after sample collection.
4 Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
6 Samples must be analyzed in the field at the time of collection.
6Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).
7 BTEX (Benzene, toluene, ethylbenzene, and xylenes), MTBE (Methyl tert-butyl ether), Naphthalene, and 1,2-dichloroethane.
8Oxygenates: ETBE(Ethyl tert-butyl ether), ETBA (ethyl tert-butyl alcohol), TAME (tertiary-amyl methyl ether), DIPE (diisopropyl ether), TBF (tert-butyl formate), TBA (tert-butyl alcohol), TAA (tert-amyl alcohol), and ethanol

Table 2
Required Containers, Preservation Techniques, Holding Times
Soil Samples[1]

Contaminant	Container[2]	Preservation[3]	Holding Time[4]
Volatiles[8] (BTEX and MTBE)	Method 5035: 2 x 40-mL glass vials with septum and stirring bars	See Method 5035 Cool to 4°C	14 days
Polynuclear Aromatic Hydrocarbons (PAH)	Amber glass container with Teflon-lined lid	Cool to 4°C Store in dark	14 days until extraction 40 days after extraction
Total Petroleum Hydrocarbons (TPH) Waste Oil	Glass wide-mouth container with Teflon-lined lid	Cool to 4°C HCl to pH <2, when practical	Analyze as soon as possible
Total Petroleum Hydrocarbons (TPH) (High Boiling Point Fuels)	Amber Glass container with Teflon-lined lid	Cool to 4°C	14 days until extraction 40 days after extraction
Total Organic Carbon	P, G	Cool to 4°C	28 days
Mercury	P, G	None	28 days
Metals (except mercury)	P, G	None	6 months

1 SW846, Third Edition, Updates I, II, IIA, and III, Table 4-1 Sample Containers, Preservation, Techniques, and Holding Times.
2 Polyethylene (P) or Glass (G).
3 Sample preservation must be performed immediately after sample collection.
4 Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
5 BTEX (Benzene, toluene, ethylbenzene, and xylenes) and MTBE (Methyl-tert-butyl ether).

Table 3
Analytical Methodology for Ground-Water Samples
Gasoline, Diesel, Fuel Oil, Kerosene

Contaminant	Analytical Method	Reference	Reporting Limit[6]
Volatiles[5] (BTEX, MTBE, Naphthalene, and 1,2 DCA)	EPA Method 5030B with EPA Method 8260B	SW846[1]	5 µg/L
1,2-dibromoethane (EDB)	EPA Method 8011	SW846[1]	0.02 µg/L
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3510C[4] with EPA Method 8270C or EPA Method 8310	SW846[1]	10 µg/L
Oxygenates[9]	EPA Method 5030B with EPA Method 8260B	SW846[1]	5 µg/L
Methane	Kerr Method	RSKSOP-175[7]	Not available
Dissolved Oxygen	SM4500-O G	Standard Methods[2]	Not available
Ferrous Iron	SM3500-Fe D EPA Method 6010B[8]	Standard Methods[2] SW846[1]	Not available 20 µg/L
Lead[3]	EPA Method 7421	SW846[1]	2 µg/L
Nitrate	EPA Method 9056 or EPA Method 9210	SW846[1]	100 µg/L 1 mg/L
Sulfate	EPA Method 9056 or EPA Method 9038	SW846[1]	1 mg/L 5 mg/L
Total Organic Carbon (TOC)	EPA Method 9060	SW846[1]	1 mg/L

1 SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
2 *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992, American Public Health Association.
3 Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).
4 Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.
5 BTEX (Benzene, toluene, ethylbenzene, and xylenes), MTBE (Methyl-tert-butyl ether), Naphthalene, and 1,2-dichloroethane.
6 Reporting Limit (RL): The Reporting Limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the Reporting Limit analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample Reporting Limits are highly matrix dependent.
7 Sample Preparation and Calculations for Dissolved Gas Analysis in Water Samples using a GC Headspace Equilibration Technique, EPA, Ada, OK, RSKSOP-175.
8 If field analysis of ferrous iron is not performed, laboratory analysis can be performed if sample is analyzed within 24 hours of sample collection. The method for laboratory analysis is SW-846 Method 6010B.
9 Oxygenates: ETBE(Ethyl tert-butyl ether), ETBA (ethyl tert-butyl alcohol), TAME (tertiary-amyl methyl ether), DIPE (diisopropyl ether), TBF (tert-butyl formate), TBA (tert-butyl alcohol), TAA (tert-amyl alcohol), and ethanol

Table 4
Analytical Methodology for Soil Samples
Gasoline, Diesel, Fuel Oil, Kerosene

Contaminant	Analytical Method	Reference	Reporting Limit[4]
Volatiles (BTEX and MTBE)	EPA Method 5035 with EPA Method 8260B	SW846[1]	5 µg/kg
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3550B[3] with EPA Method 8270C or EPA Method 8310	SW846[1]	330 µg/kg
Total Petroleum Hydrocarbons[2] (TPH)-DROs (Diesel Range Organics)	EPA Method 3550B[3] with EPA Method 8015B	SW846[1]	33.3 mg/kg
Lead	EPA Method 7421	SW846[1]	0.25 µg/kg
Total Organic Carbon (TOC)	EPA Method 9060	SW846[1]	------[5]

1 SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
2 Used for Soil Leachability Model only.
3 Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.
4 Reporting Limit (RL): The Reporting Limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the Reporting Limit analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample Reporting Limits are highly matrix dependent.
5 The laboratory must use TOC instrumentation equipped for the analysis of soil samples.

Table 5
Analytical Methodology for Ground-Water Samples
Waste Oil

Contaminant	Analytical Method	Reference	Reporting Limit[6]
Volatiles (BTEX)	EPA Method 5030B with EPA Method 8260B	SW846[1]	5 µg/L
Total Petroleum Hydrocarbons (TPH)	EPA Method 9070A[5] with silica cleanup	SW846[1]	5 mg/L
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3510C[3] with EPA Method 8270C or EPA Method 8310C	SW846[1]	10 µg/L
Nitrate	EPA Method 9056 or EPA Method 9210	SW846[1]	100 µg/L 1 mg/L
Sulfate	EPA Method 9056 or EPA Method 9038	SW846[1]	1 mg/L 5 mg/L
Total Organic Carbon (TOC)	EPA Method 9060	SW846[1]	1 mg/L
Dissolved Oxygen	SM4500-O G	Standard Methods[2]	Not available
Ferrous Iron	SM3500-Fe D EPA Method 6010B[7]	Standard Methods[2] SW846[1]	Not available 20 µg/L
Lead[4]	EPA Method 7421	SW846[1]	2 µg/L
Mercury	EPA Method 7470A	SW846[1]	0.02 µg/L
Trace Metals: [4]			
Arsenic	EPA Method 7060A	SW846[1]	5 µg/L
Barium	EPA Method 6010B		50 µg/L
Cadmium	EPA Method 7131A		0.1 µg/L
Chromium	EPA Method 7191		5 µg/L
Selenium	EPA Method 7740		5 µg/L
Silver	EPA Method 7761		5 µg/L

1 SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
2 *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992, American Public Health Association.
3 Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.
4 Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).
5 This is the hexane extraction method. Please refer to 40 CFR Parts 136 and 260, "Guidelines Establishing Test Procedures for the Analysis of Oil & Grease and Non-Polar Material under the Clean Water Act and Resource Conservation and Recovery Act: Final Rule", dated May 14, 1999.
6 Reporting Limit (RL): The Reporting Limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the Reporting Limit analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample Reporting Limits are highly matrix dependent.
7 If field analysis of ferrous iron is not performed, laboratory analysis can be performed if sample is analyzed within 24 hours of sample collection. The method for laboratory analysis is SW-846 Method 6010B.

Table 6
Analytical Methodology for Soil Samples/Oil Samples
Waste Oil

Contaminant	Analytical Method	Reference	Reporting Limit[4]
Volatiles (BTEX)	EPA Method 5035 with EPA Method 8260B	SW846[1]	5 µg/kg
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3550B[3] with EPA Method 8270C or EPA Method 8310	SW846[1]	330 µg/kg
Total Petroleum Hydrocarbons[2] (Waste Oil)	EPA Method 9071B with Silica cleanup	SW846[1]	250 mg/kg
Total Organic Carbon (TOC)	EPA Method 9060	SW846[1]	------[5]
Mercury	EPA Method 7471A	SW846[1]	10 µg/kg
Trace Metals: [4]		SW846[1]	
Arsenic	EPA Method 7060A		0.25 mg/kg
Barium	EPA Method 6010B		2.5 mg/kg
Cadmium	EPA Method 7131A		0.25 mg/kg
Chromium	EPA Method 7191		0.25 mg/kg
Lead	EPA Method 7421		0.25 mg/kg
Selenium	EPA Method 7740		0.25 mg/kg
Silver	EPA Method 7761		0.25 mg/kg

1 SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
2 Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.
3 This is the hexane extraction method. Please refer to 40 CFR Parts 136 and 260, "Guidelines Establishing Test Procedures for the Analysis of Oil & Grease and Non-Polar Material under the Clean Water Act and Resource Conservation and Recovery Act: Final Rule", dated May 14, 1999.
4 Reporting Limit (RL): The Reporting Limit is the lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes, the Reporting Limit analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample Reporting Limits are highly matrix dependent.
5 The laboratory must use TOC instrumentation equipped for the analysis of soil samples.